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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/567,369	05/15/2006	Noboru Ichinose	PKHF-04053US	9867

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MCGINN INTELLECTUAL PROPERTY LAW GROUP, PLLC
8321 OLD COURTHOUSE ROAD
SUITE 200
VIENNA, VA 22182-3817

EXAMINER

SALERNO, SARAH KATE

ART UNIT	PAPER NUMBER
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2814

MAIL DATE	DELIVERY MODE
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10/22/2010

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/567,369	Applicant(s) ICHINOSE ET AL.	
	Examiner SARAH K. SALERNO	Art Unit 2814	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 September 2010.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,4,6,9-13,15 and 21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,4,6,9-13,15 and 21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>10/1/10</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. Applicant's amendment/arguments filed on 03/08/10 being acknowledged and entered. The 35 USC § 103 rejection of claims 1, 6, 9-13, 15, and 21 in the Final office action dated 07/01/10 is withdrawn based on applicants arguments.
2. Applicant's amendment/arguments filed on 03/18/10 as being acknowledged. By this amendment claims 2, 3, 5, 7, 8, 14, and 16-20 are canceled, no claims have been added, claims 1, 6, 9-13, 15, and 21 are pending and no claims are withdrawn.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1, 4, 6, 9, 10, 15 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yang et al. "Preparation and structural properties for GaN films grown on Si (111) by annealing" (2002) Applied Surface Science pp. 254-260 in view of Park et al. "Ammonolysis of Ga₂O₃ and its application to the sublimation source for the growth of GaN Film" (2004) Journal of Crystal Growth pp.1-6.

Claim 1: Yang teaches a semiconductor layer, comprising:

a first layer comprising a Ga₂O₃ system crystal substrate; and

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a second layer comprising a nitride surface of said first layer containing oxygen and nitrogen (pages 254-260).

Yang does not teach the Ga_2O_3 system crystal substrate being of a single crystal Ga_2O_3 system. Park teaches the Ga_2O_3 system crystal substrate being of a single crystal Ga_2O_3 system for use as a base to grow a GaN film for use in light emitting devices (pages 1-6). Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to have specified in Yang that the Ga_2O_3 system crystal substrate was a single crystal Ga_2O_3 system for use as a base to grow a GaN film for use in light emitting devices as taught by Park (pages 1-6).

Claim 4: Yang teaches the first layer comprises Ga_2O_3 , $(\text{In}_x\text{Ga}_{1-x})_2\text{O}_3$ where $0 \leq x < 1$, $(\text{Al}_x\text{Ga}_{1-x})_2\text{O}_3$ where $0 \leq x < 1$, $(\text{In}_x\text{Al}_y\text{Ga}_{1-x-y})_2\text{O}_3$ where $0 \leq x < 1$, $0 \leq y < 1$, and $0 \leq x + y < 1$, or the like, as a main constituent (pages 254-260).

Claim 6: Yang teaches a semiconductor layer, comprising:

a first layer comprising a Ga_2O_3 system crystal substrate; and

a second layer comprising a nitride surface of said first layer containing oxygen and nitrogen,

a third layer comprising a GaN system epitaxial layer grown on the second layer (pages 254-260).

Yang does not teach the Ga_2O_3 system crystal substrate being of a single crystal Ga_2O_3 system. Park teaches the Ga_2O_3 system crystal substrate being of a single crystal Ga_2O_3 system for use as a base to grow a GaN film for use in light emitting devices (pages 1-6). Therefore it would have been obvious to one of ordinary skill in

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the art at the time the invention was made to have specified in Yang that the Ga_2O_3 system crystal substrate was a single crystal Ga_2O_3 system for use as a base to grow a GaN film for use in light emitting devices as taught by Park (pages 1-6).

Claim 9: Park teaches the first layer consists of a single crystal β - Ga_2O_3 (pages 1-6).

Claim 10: Park teaches the single crystal β - Ga_2O_3 has a prismatic shape having a square in cross section, and its axis direction matches a-axis $100>$ orientation, b-axis $010>$ orientation or c-axis $001>$ orientation (pages 1-6).

Claim 15: Park teaches the first layer consists of single crystal β - Ga_2O_3 (pages 1-6).

Claim 21: Kryliouk teaches a semiconductor layer, comprising:
a first layer comprising a Ga_2O_3 system crystal substrate; and
a second layer comprising a nitride surface of said first layer which contains oxygen and nitrogen,
wherein the second layer comprises a GaN compound (pages 254-260).

Yang does not teach the Ga_2O_3 system crystal substrate being of a single crystal Ga_2O_3 system. Park teaches the Ga_2O_3 system crystal substrate being of a single crystal Ga_2O_3 system for use as a base to grow a GaN film for use in light emitting devices (pages 1-6). Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to have specified in Yang that the Ga_2O_3 system crystal substrate was a single crystal Ga_2O_3 system for use as a base to grow a GaN film for use in light emitting devices as taught by Park (pages 1-6).

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5. Claims 11-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yang et al. "Preparation and structural properties for GaN films grown on Si (111) by annealing" (2002) Applied Surface Science pp. 254-260 in view of Park et al.

"Ammonolysis of Ga₂O₃ and its application to the sublimation source for the growth of GaN Film" (2004) Journal of Crystal Growth pp.1-6, as applied to claim 1 above, and further in view of Kryliouk (US Patent 6,350,666)

Regarding claim 11, as described above, Yang and Park substantially read on the invention as claimed, except Yang and Park do not teach first layer comprises $(\text{In}_x\text{Ga}_{1-x})_2\text{O}_3$ where $0 < x < 1$. Kryliouk teaches the first layer comprises $(\text{In}_x\text{Ga}_{1-x})_2\text{O}_3$ where $0 < x < 1$ as one of many substrate nitrided to form a GaN layer for use in light emitting devices (Col. 4). Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the device taught by Yang and Park to have the first layer comprise $(\text{In}_x\text{Ga}_{1-x})_2\text{O}_3$ where $0 < x < 1$ as one of many substrate nitrided to form a GaN layer for use in light emitting devices as taught by Kryliouk (Col. 4).

Claim 12: Kryliouk teaches the first layer comprises $(\text{Al}_x\text{Ga}_{1-x})_2\text{O}_3$ where $0 < x < 1$ (Col. 4).

Claim 13: Kryliouk teaches the first layer comprises $(\text{In}_x\text{Al}_y\text{Ga}_{1-x-y})_2\text{O}_3$ where $0 < x < 1$, $0 < y < 1$, and $0 < x + y < 1$ (Col. 4).

Response to Arguments

6. Applicant's arguments with respect to claims 1, 4, 6, 9-13, 15 and 21 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

7. Applicant's amendment on 3/18/10 necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to whose telephone number is (571)270-1266. The examiner can normally be reached on M-R 8:00-4:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (571) 272-1705. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Wael M Fahmy/
Supervisory Patent Examiner, Art
Unit 2814

/S. K. S./
Examiner, Art Unit 2814